

REMARKS

Review and reconsideration on the merits are requested.

Claims 1-7 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,811,915 to Abe et al. Also, claims 8 and 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Abe et al.

The Examiner considered Abe et al. as disclosing the inventive method substantially as claimed, including providing a chip including a flange portion and protrusion protruding from a first face of the flange portion, and tentatively joining, through resistance welding, a second face of the flange portion opposite the protrusion to a joint face of the electrode base metal of at least one of the center electrode and the ground electrode. With respect to product claims 8 and 9, the Examiner considered that it would have been obvious to set the weld portion to contain components of the chip in the range of from 20 to 80 % by mass so as to reduce thermal stress in the welding portion and properly maintain the connecting strength between the center electrode and the chip.

Applicants traverse, and respectfully request the Examiner to reconsider for the following reasons.

The independent claims are method claim 1 and product claim 7.

The method of claim 1 includes providing a chip 1 comprising a flange portion 1b and a protrusion 1a protruding from a first face 1c of the flange portion 1b, and tentatively joining, through resistance welding, a second face 1d of the flange portion 1b opposite the protrusion 1a to a joint face 32, 42 of the electrode base metal of at least either one of the sensor electrode and

the ground electrode, the joint face 32, 42 being located on a side toward the discharge gap (claim 1 and Figs. 2 and 4).

As claimed in claim 4, the method further comprises providing a plate-like intermediate member 2 having at least one of the melting point and linear expansion coefficient falling between that of the electrode base metal and that of the chip, and having a face larger than the second face 1d of the flange portion 1b, between the joint face 32, 42 and the chip 1. As claimed in claim 5 depending from claim 4, the method further comprises tentatively joining the second face 1d of the flange portion 1b to the intermediate member 2 through resistance welding.

As claimed in product claim 7, the spark plug includes a chip 1 comprising a flange portion 1b and a protrusion 1a protruding from a first face 1c of the flange portion 1b, and a second face 1d of the flange portion 1b opposite the protrusion 1a tentatively joined through resistance welding, to a joint face 32, 42 of the electrode base metal of at least either one of the center electrode and the ground electrode.

As described in paragraph [06] at page 3 of the specification, the present invention provides a spark plug whose joining strength between an electrode base metal and a chip is reliably ensured, as well as a method of manufacturing the same.

Turning to the cited prior art, although Fig. 3A and the disclosure at column 5, lines 38-42 describe resistance welding of a noble metal chip 5 on the tip 3a of the center electrode 3 using a welding electrode 7, nowhere does Abe et al. disclose or otherwise illustrate providing a chip comprising a flange portion and a protrusion protruding from a first face of the flange portion, and tentatively joining, through resistance welding, a second face of the flange portion

opposite the protrusion to a joint face of the electrode base metal as required by method claim 1. Namely, Abe et al. simply shows and describes resistance welding of a noble metal chip 5, in perfectly cylindrical form, to the tip of center electrode 3a. The noble metal chip 5 has no flange portion, and nowhere does Abe et al. disclose joining a second face of the flange portion opposite the protrusion to a joint face of the electrode base metal as required by method claim 1.

More particularly, claim 1 requires providing a chip comprising a flange portion, but no such chip comprising a flange portion is provided in Abe et al. Rather, upon resistance heating, the melted center electrode 3 is extruded around the outer periphery of a noble metallic chip 5, and is raised so as to form the protruding portion 3c (column 5, line 65-column 6, line 2 of Abe et al.). The protruding portion 3c is not part of the noble metal chip 5, and for this reason alone Abe et al. does not meet method claim 1. Fusion portions A and B of Fig. 2 of Abe et al. are formed following laser irradiation. See column 6, lines 6-41 of Abe et al.

Relative to claims 4 and 5, Abe et al. also fails to disclose or otherwise illustrate providing a plate-like intermediate member between the joint face and the chip, or tentatively joining the second face of the flange portion to the intermediate member through resistance welding, as claimed. The Examiner cites Fig. 2, items A or B of Abe et al., but A and B are not arranged between the joint face and the chip but rather are melted portions of the center and ground electrodes which form protruding portions along outer peripheries of the noble metal chip (Abstract).

Claim 7 has been amended to distinguish the claimed spark plug from that of Abe et al. in terms of structure. Particularly, as shown in Fig. 6 of the present specification, claim 7 has been

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amended to recite that a part of the weld portion 3 inwardly extends between the electrode base metal 30, 40 and the first end of the chip 1. That is, as shown in Fig. 6, weld portion 3 extends inward and below corresponding intersections of the second face 1d of the flange portion 1b and imaginary extension lines of the side surface of the protrusion 1a.

On the other hand, no such weld portion A or B of Abe et al. extends below the noble metal chip 5. Also, Abe et al. fails to show intermediate member 2 as claimed in new claim 10.

For the above reasons, it is respectfully submitted that the present invention is patentable over Abe et al., and withdrawal of the foregoing rejections is respectfully requested.

Withdrawal of all rejections and allowance of claims 1-11 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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